

Statistical Validation of the ISORA8 & Static-99 Final Report

January 2010

Introduction

Previous state law mandated a minimum of five years of electronic monitoring for sex offenders whose crimes were against children. This law was changed in 2009 to permit discretion to the district departments of correctional services to base decisions on validated sex offender risk assessments and other factors. In response, the Iowa Department of Corrections developed new administrative rules to guide decisions on which sex offenders should be placed on electronic monitoring. To help inform rules development, preliminary and partial findings from the risk assessment validation effort then underway were shared in a June 2009 report.

Statistical validation of sex offender risk assessments not only fulfills the requirement of the new law; it also provides more confidence in the assessments, and more confidence in the policies being crafted to improve management of sex offender populations.

The Iowa Sex Offender Risk Assessment (ISORA8) was developed by the Iowa Division of Criminal and Juvenile Justice Planning based on a sample of over 1,000 sex offenders required to register on the Iowa Sex Offender Registry. Statistics based on the construction sample held promise for its ability to predict new sex offenses and other violent offenses. However, until now the ISORA8 has not been evaluated against a separate sample of offenders to determine its statistical validity.

The Static-99 risk assessment for male sex offenders was developed in Canada, and has been validated in many jurisdictions. A small number of Iowa cases from the 6th judicial district became part of a large multi-jurisdiction validation study of the Static-99. However, it is always good practice to validate any predictive tool in the jurisdiction in which it is used. This study represents the first statewide validation of the Static-99 in Iowa.

During analysis, we received word that the current age (Young) factor of the Static-99 had just been revised. This revised age factor was computed for each offender in the sample who had a Static-99 assessment; revised Static-99 total scores and risk categories were computed as well to allow comparison with the original Static-99 as well as the ISORA8.

Methodology

Sampling began with offenders assessed between July 1, 2005 and December 3, 2008 using the ISORA8, and then adding in Static-99 assessments where available (some offenders per Static-99 guidelines should not be assessed using that tool). Assessments were then matched with populations of offenders admitted to probation or parole; work

release; and prison discharges due to expiration of sentence. Frequently, it was found that the sex offense the risk assessment was based on occurred under a previous incarceration or supervision, and information was adjusted accordingly to reflect when the offender first had opportunity to reoffend following the assessment sex offense (or index offense per Static-99 terminology).

Some ISORA8 and Static-99 risk assessments were edited prior to analysis. In some cases, the assessments reflected offender risk *after* the sex reoffending behavior under study. In those cases, the assessments were adjusted to reflect offender risk *prior* to the sex reoffending behavior under study. Other edits identified issues to stress in future trainings, as well as items auditors should check for:

- **Static-99.** Several assessments were completed on women offenders and offenders whose sex offenses were handled in juvenile court; these assessments were deleted from the study. An issue of updating offender age as younger offenders become older was also identified.
- **ISORA8.** Assessments for individuals whose sex offenses were handled in juvenile court were deleted. The treatment risk factor is a dynamic factor. Updates were lacking in many cases, and assessments were edited to reflect updated treatment information (the majority to reflect treatment was successfully completed). An issue of failing to count the qualifying sex offense in the total number of sex offense arrests was also identified.

Offenders with no opportunity time to reoffend (such as those under sex offender civil commitment) were removed from the sample. Deceased offenders were also removed from the sample if no recidivism had occurred, and if the follow-up period was less than three years.

Preliminary findings based on 740 offenders with ISORA8 assessments, of which 701 also had a Static-99 assessment completed found neither assessment to be a good predictor with regard to any new conviction. However, preliminary results found both assessments to be good predictors with regard to recidivism criteria based on sex offenses and other violent offenses. This final report focuses solely on prediction of these latter types of recidivism:

1. New conviction for sex offense or other violent crime;
2. New conviction for sex crime using a strict definition – where the offense subtype designation was a sex offense; and
3. New conviction for sex crime using a softer definition to include offenses with an identified sexual element per file information; examples include kidnapping, assault, burglary, disseminating obscene materials to minors, etc. Sex offender registry violations were excluded.

Recidivism is based on Iowa Corrections Offender Network (ICON) data and NCIC checks, which includes information pertaining to convictions in other states. Care was taken to ensure each offender had at least two years of opportunity time on the street to reoffend for a sexual or other violent offense. Opportunity time ranged from 2 years to 8.75 years, with an average tracking period of 3.9 years.

Findings

Both the ISORA8 and Static-99 risk assessments are good to excellent predictors of:

1. New conviction for sex offense or other violent crime;
2. New conviction for sex crime using a strict definition – where the offense subtype designation was a sex offense; and
3. New conviction for sex crime or offense with an identified sexual element.

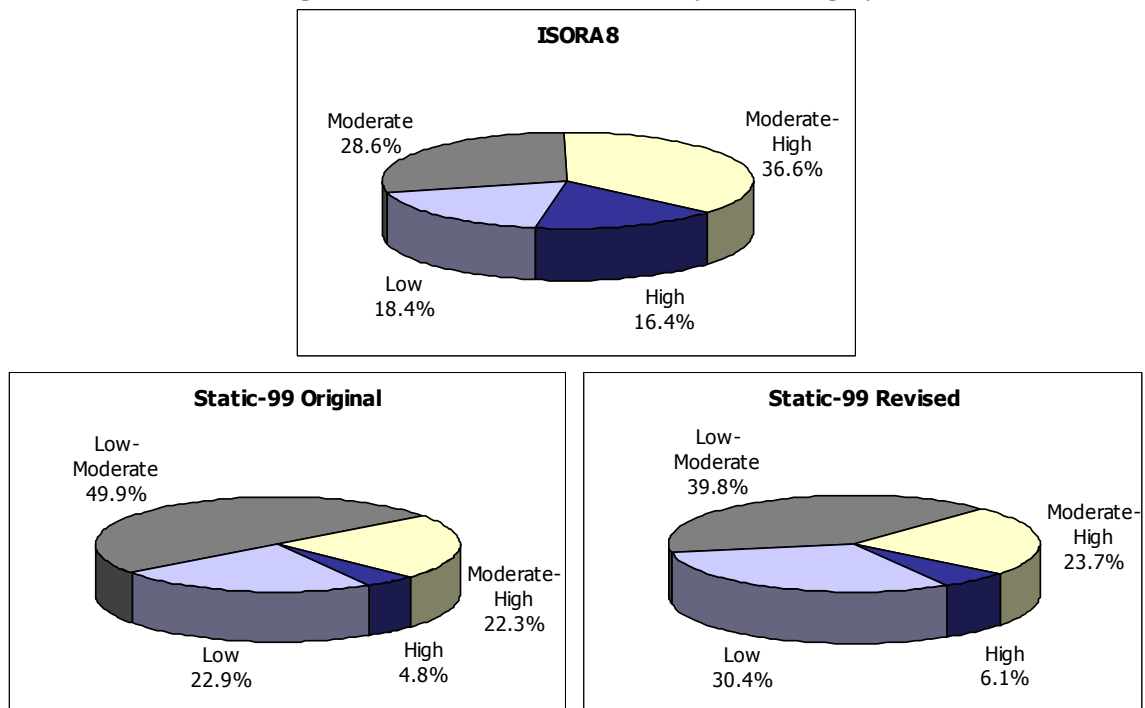
The revised Static-99 performed marginally better than the original Static-99 with regard to prediction of new convictions for sex offenses and other violent crime, but the trade-off is a slightly lower predictive efficiency for sex offenses in particular.

The following pages provide detail for these findings, and recommend revised risk categories for the Static-99, and more extensive revisions to the ISORA. The resulting assessments are excellent predictors of all three of the above recidivism criteria. Further, the ISORA appears to be promising with regard to prediction of recidivism for female sex offenders. A combined scoring scheme using both assessments is also offered.

The Assessments: Different Prediction Strategies

Figure 1 summarizes the distribution of offenders by risk category for each of the assessments. As shown, the ISORA8 scores many more offenders as Moderate-High and High compared to the Static-99. The Moderate category of the ISORA8 is much smaller than the Low-Moderate category of the Static-99. However, the Low risk categories of the Static-99, particularly the revised version, are larger than the low risk category of the ISORA8. Comparing the Static-99 revised version with the original Static-99, one may observe that the revised assessment results in larger low and high risk categories, and a reduction in the number scoring Low-Moderate.

Figure 1. Distribution of Offenders by Risk Category



Figures 2 through 4 summarize recidivism numbers and rates for each risk category of the assessments. For all assessments one may generally observe increasingly higher recidivism rates at each higher risk level. However, the ISORA8 with its larger higher risk group encompasses a larger numeric share of recidivism in the upper risk categories. The result is a lower rate of recidivism for the High risk group (compared with the Static-99), but also lower rates of recidivism for lower risk offenders. The Static-99, on the other hand, isolates a small, elite group at the upper end that exhibits a very high likelihood of reoffending. As a result of this strategy, lower risk offenders have higher rates of recidivism compared to lower risk offenders on the ISORA8.

For example, Figure 3 describes recidivism as measured by new conviction for a sex offense (strict definition). For the ISORA8, 30 of the 35 or about 86% of the new sex offense convictions were committed by offenders scoring Moderate-High or High risk. For the Static-99 Revised, 23 of the 33 or about 70% of the new sex offense convictions were committed by offenders scoring Moderate-High or High risk. However, the recidivism rate for High risk offenders on the Static-99-Revised was 14% -- nearly twice as high as the recidivism rate for those who scored High risk on the ISORA8.

As discussed in this report, while the ISORA8 and Static99 risk assessments score offenders very differently, they are both statistically valid predictors of recidivism.

Figure 2. Recidivism Rates: New Conviction for Sex Offense or Other Violent Crime

Risk Category	Total in Sample			Recidivism Rates					
	ISORA8	Static-99	Static-99	ISORA8		Static-99 Original		Static-99 Revised	
		Original	Revised	N	%	N	%	N	%
Low	182	215	285	4	2.2%	9	4.2%	14	4.9%
Moderate or Low-Moderate	282	468	373	21	7.4%	43	9.2%	32	8.6%
Moderate-High	361	209	222	63	17.5%	42	20.1%	45	20.3%
High	162	45	57	30	18.5%	18	40.0%	21	36.8%
Totals	987	937	937	118	12.0%	112	12.0%	112	12.0%

Figure 3. Recidivism Rates: New Conviction for Sex Offense - Strict Definition

Risk Category	Total in Sample			Recidivism Rates					
	ISORA8	Static-99	Static-99	ISORA8		Static-99 Original		Static-99 Revised	
		Original	Revised	N	%	N	%	N	%
Low	182	215	285	1	0.5%	3	1.4%	5	1.8%
Moderate or Low-Moderate	282	468	373	4	1.4%	9	1.9%	6	1.6%
Moderate-High	361	209	222	18	5.0%	13	6.2%	14	6.3%
High	162	45	57	12	7.4%	8	17.8%	8	14.0%
Totals	987	937	937	35	3.5%	33	3.5%	33	3.5%

Figure 4. Recidivism Rates: New Conviction for Sex Offense or Crime With Sexual Element

Risk Category	Total in Sample			Recidivism Rates					
	ISORA8	Static-99	Static-99	ISORA8		Static-99 Original		Static-99 Revised	
		Original	Revised	N	%	N	%	N	%
Low	182	215	285	1	0.5%	3	1.4%	5	1.8%
Moderate or Low-Moderate	282	468	373	4	1.4%	12	2.6%	9	2.4%
Moderate-High	361	209	222	24	6.6%	17	8.1%	17	7.7%
High	162	45	57	16	9.9%	11	24.4%	12	21.1%
Totals	987	937	937	45	4.6%	43	4.6%	43	4.6%

Validation Results: Mean Cost Rating

The predictive strength of each assessment was evaluated using the Mean Cost Rating (MCR) statistic, “perhaps the most satisfactory statistical index of predictive selectivity” (Inciardi, Babst, Koval 1973). MCR is a special case of Somers’ D (Greene, Hoffman, Beck 1994), and appropriate to use with ordinal data.

MCR measures the effectiveness of a risk assessment instrument by weighing the costs of assessing cases incorrectly at each risk level with the benefits of assessing risk correctly at each risk level in regards to a third factor such as recidivism (Berkson, 1947). MCR scores vary from 0.00 to 1.00; a score of zero indicates that there is no prediction of recidivism, and a score of 1.00 indicates a perfect prediction. “For a device to show any utility for screening or predictive purposes, it must demonstrate a value of MCR of at least .250 and a value of at least .350 to significantly improve on existing judgments (Fischer, 1985).”

Figure 5
Mean Cost Rating (MCR) Scores

Recidivism Criterion	ISORA8	Original Static-99	Revised Static-99
For Total (Raw) Scores:			
New Sex/Violent Conviction	0.386	0.432	0.441
New Sex Conviction - Strict	0.454	0.496	0.436
New Sex Conviction or Sexual Element	0.481	0.539	0.474
For Risk Categories:			
New Sex/Violent Conviction	0.326	0.375	0.396
New Sex Conviction - Strict	0.395	0.433	0.410
New Sex Conviction or Sexual Element	0.431	0.469	0.457

Analysis of total (raw) scores. As shown in Figure 5, MCR scores for the raw numeric scores of both assessments exceeded the Fischer standard of .350 and were therefore found to be excellent predictors of all of the following: a) new convictions for sex offenses or other violent crime; b) new convictions for sex crimes using a strict definition; and c) new convictions for sex crimes using a softer definition to include offenses with a sexual element (but excluding sex offender registry violations). The revised Static-99 performed marginally better than the original Static-99 with regard to prediction of new convictions for sex offenses and other violent crime, but the trade-off is a slightly lower predictive efficiency for sex offenses in particular.

Analysis of current risk categories. MCR scores for the current risk categories (groupings of the numeric scores) exceeded the Fischer standard and were therefore found to be excellent predictors of all three measures of recidivism, with the exception of prediction of new sex offenses or other violent crimes for the ISORA8, which was close to the Fischer standard. Again, compared with the original Static-99, the revised Static-99 was marginally better at prediction of new sex offenses or other violent crimes (but with slightly lower predictive efficiency for sex offenses in particular).

Validation Results: ROC Curve

The ROC Curve is a useful way to evaluate the performance of classification schemes in which there is one variable with two categories by which subjects are classified – in this case, recidivism or no recidivism. Like MCR, a score of 1 represents perfect prediction, and therefore higher scores are more favorable. In previous studies of the Static-99 elsewhere, ROC Curve results have ranged between .70 and .89 (per the Iowa Static-99 training PowerPoint presentation). The ROC Curve result for the ISORA8 construction sample in predicting new conviction for a sex offense was .726.

Figure 6
ROC Curve Results

Recidivism Criterion	ISORA8	Original Static-99	Revised Static-99
For Total (Raw) Scores:			
New Sex/Violent Conviction	0.693	0.716	0.720
New Sex Conviction - Strict	0.727	0.748	0.718
New Sex Conviction or Sexual Element	0.740	0.770	0.737
For Risk Categories:			
New Sex/Violent Conviction	0.663	0.688	0.698
New Sex Conviction - Strict	0.698	0.716	0.705
New Sex Conviction or Sexual Element	0.716	0.734	0.729

Analysis of total (raw) scores. As shown in Figure 6, both assessments exceeded ROC Curve results of .70 for all three definitions of recidivism, with the exception of prediction of new sex offenses or other violent crime for the ISORA8, which was close to this benchmark. As with the MCR score findings, the revised Static-99 was marginally better than the original Static-99 at prediction of new sex offenses or other violent crime.

Analysis of current risk categories. ROC Curve results for the ISORA8 were close to the .70 benchmark for prediction of new sex offenses or other violent crimes and new convictions for sex crimes (strict definition) – and exceeded the benchmark of .70 for prediction of sex offenses or crimes with a sexual element. ROC Curve results for the Static-99 exceeded .70 for prediction of new convictions for sex offenses (both definitions), and was close to the .70 benchmark for prediction of new convictions for sex offenses or other violent crimes. Compared with the original Static-99, the revised Static-99 was marginally better at prediction of new sex offenses or other violent crimes.

Predictive Strength of Risk Items

The predictive strength of each item on the ISORA8 and Static-99 assessments was evaluated using a variety of measures. Shown below are Somers' D results (Somers' D is the basis for the MCR score).

Figure 7
Individual Assessment Items: Predictive Strength (Summary)

ISORA8:	Poor	Adequate	Good	Excellent
Age at 1st Conviction for Sex Offense		✓		
Offender Abused as a Child	✓			
Number of victims - current offense		✓		
Relationship to victim - past/current offenses			✓	
Manipulation of victim - past/current offenses	✓			
Number of arrests for sex offenses			✓	
Prior non-sex-related crimes		✓		
Sex Offender Counseling or Treatment			✓	
Static99:				
Young (Original & Revised Scales)		✓		
Single		✓		
Index non-sexual violence		✓		
Prior non-sexual violence		✓		
Prior Sex Offenses				✓
Prior sentencing dates		✓		
Any convictions for non-contact sex offenses				✓
Any unrelated victims		✓		
Any stranger victims			✓	
Any male victims		✓		

Note: The terms, Good, Poor, etc. were selected by the author to describe the predictive strength of each risk item based on Somers' D. Readers may interpret the terms as follows:

- **Poor:** Does not appear to add to the predictive strength of the risk assessment.
- **Adequate:** Appears to contribute to the predictive strength of the risk assessment for one or more recidivism criteria.
- **Good:** Contributes to overall prediction and *by itself* exceeds the Fischer MCR standard of .250 (utility for screening purposes) for one or more recidivism criteria.
- **Excellent:** Contributes to overall prediction and *by itself* exceeds the Fischer MCR standard of .350 (significant improvement on existing judgments) for one or more recidivism criteria.

As shown in Figure 7, the best predictors on the ISORA8 were relationship to victims (i.e., victimization of strangers), number of arrests for sex offenses, and sex offender counseling/treatment. Two factors were found to be poor predictors: offender abused as a child; and manipulation of the victim.

The best predictors on the Static-99 were prior sex offenses, any convictions for non-contact sex offenses (with both of these being excellent predictors), and any stranger victims. The remaining items were adequate predictors for one or more recidivism criteria.

The charts on the following pages provide further detail for the Figure 7 summary. Items are grouped by type of risk factor rather than in the order found on each assessment, to more readily provide for comparisons among the risk items:

- Figure 8 – Offender Characteristics
- Figure 9 – Offender Criminal History (including current offense)
- Figure 10 – Victim Characteristics
- Figure 11 – Treatment History

Regarding the detail, of particular note are the following observations:

- Offenders who had been abused as children, or who had manipulated their victims (rather than used coercion) were actually *less* likely to incur new convictions for sex offenses and/or other violent crime than offenders who did not have these factors.
- For the Static-99, the revised age factor, Young, was better than the original age scoring scheme at predicting new sex offenses or other violent crimes – but was not better at predicting sex crimes in particular (using either definition).
- The best risk factors were found in offender criminal history, victim characteristics and treatment history.
 - ✓ *Number of arrests for sex offenses (ISORA8)*. Offenders with two or more sex-related arrests (including the current offense) were more than five times as likely to be convicted of a new sex crime (strict definition) than first-time sex offenders.
 - ✓ *Prior sex offenses (Static-99)*. Recidivism for new sex offenses (either definition) ranged from just over 2% for those scoring lowest on this item, up to 50% for the highest scorers.
 - ✓ *Any convictions for non-contact sex offenses (Static-99)*. Offenders with one or more such convictions were roughly six times more likely to be convicted of a new sex offense (strict definition) than those with none.
 - ✓ *Any stranger victims (ISORA8 and Static-99)*. The assessments have slightly different definitions of what constitutes a stranger, but both were found to be predictive – although the item on the Static-99 was the stronger predictor of the two. For the ISORA8, offenders who had victimized strangers were roughly three times more likely to be convicted of a new sex crime or crime with a sexual element than those with no stranger victims. For the Static-99, offenders who had victimized strangers were roughly four times more likely to be convicted of a new sex crime or crime with a sexual element than those with no stranger victims.
 - ✓ *Sex offender counseling/treatment (ISORA8)*. Offenders who successfully completed sex offender counseling or treatment were roughly eight times less likely to be convicted of a new sex offense (strict definition), compared to offenders who received no treatment or were unsuccessfully terminated. Short of an evaluation, these findings are encouraging with regard to the effectiveness of sex offender treatment.

Figure 8
Individual Assessment Items: Predictive Strength
Offender Characteristics

Tool	Assessment Item/Scoring	Total N	% of Total	New Sex/Violence Conviction		New Sex Conviction		New Sex Conv or Sex Element		Overall Predictive Strength
				Recid Rate	Somers' d	Recid Rate	Somers' d	Recid Rate	Somers' d	
ISORA8	Age at 1st Conviction for Sex Offense									
	Over 25 years old	540	54.7%	9.6%	0.121	3.3%	0.034	3.9%	0.084	Adequate
	25 years old or less	447	45.3%	14.8%		3.8%		5.4%		
ISORA8	Offender Abused as a Child									
	Not abused	587	59.5%	12.3%	-0.018	3.9%	-0.065	4.6%	-0.006	Poor
	Physical, emotional or sexual abuse	400	40.5%	11.5%		3.0%		4.5%		
Static99	Young									
	Age 25 or older	749	79.9%	10.1%	0.137	3.1%	0.106	4.0%	0.107	Adequate
	Age 18 to 24.99	188	20.1%	19.1%		5.3%		6.9%		
Static99	Young Revised									
	Age 60 or older	64	6.8%	4.7%	0.202	3.1%	0.044	4.7%	0.086	Adequate
	Age 40 to 59.9	310	33.1%	7.7%		3.2%		3.5%		
	Age 35 to 39.9	117	12.5%	12.8%		3.4%		4.3%		
	Age 18 to 34.99	446	47.6%	15.7%		3.8%		5.4%		
Static99	Single - Ever lived with lover for at least two years?									
	Yes	529	56.5%	10.2%	0.094	3.0%	0.083	3.4%	0.153	Adequate
	No	408	43.5%	14.2%		4.2%		6.1%		

Figure 9
Individual Assessment Items: Predictive Strength
Offender Criminal History

Tool	Assessment Item/Scoring	Total N	% of Total	New Sex/Violence Conviction		New Sex Conviction		New Sex Conv or Sex Element		Overall Predictive Strength
				Recid Rate	Somers' d	Recid Rate	Somers' d	Recid Rate	Somers' d	
ISORA8	Number of arrests for sex offenses									
	None	3	0.3%	0.0%		0.0%		0.0%		Good
	One sex-related arrest	853	86.4%	10.3%	0.141	2.2%	0.338	3.0%	0.305	
	Two or more sex-related arrests	131	13.3%	22.9%		12.2%		14.5%		
ISORA8	Prior non-sex-related crimes									
	No prior criminal history (non-sex)	369	37.4%	7.6%	0.155	3.3%	0.032	4.1%	0.042	Adequate
	Prior criminal history present	618	62.6%	14.6%		3.7%		4.9%		
Static99	Index non-sexual violence									
	No	849	90.6%	11.2%	0.066	3.7%	-0.035	4.8%	-0.05	Adequate
	Yes	88	9.4%	19.3%		2.3%		2.3%		
Static99	Prior non-sexual violence									
	No	671	71.6%	8.6%	0.225	3.6%	-0.012	4.3%	0.044	Adequate
	Yes	266	28.4%	20.3%		3.4%		5.3%		
Static99	Prior Sex Offenses									
	None	733	78.2%	10.5%	0.114	2.2%	0.333	2.6%	0.371	Excellent
	1-2 Charges/1 Conviction	175	18.7%	15.4%		6.3%		10.3%		
	3-5 Charges/2-3 Convictions	27	2.9%	25.9%		18.5%		18.5%		
	6+ Charges/4+ Convictions	2	0.2%	50.0%		50.0%		50.0%		
Static99	Prior sentencing dates									
	3 or less	686	73.2%	9.2%	0.193	3.2%	0.068	4.1%	0.085	Adequate
	4 or more	251	26.8%	19.5%		4.4%		6.0%		
Static99	Any convictions for non-contact sex offenses									
	No	813	86.8%	10.0%	0.164	2.1%	0.365	2.8%	0.349	Excellent
	Yes	124	13.2%	25.0%		12.9%		16.1%		

Figure 10
Individual Assessment Items: Predictive Strength
Victim Characteristics

Tool	Assessment Item/Scoring	Total N	% of Total	New Sex/Violence Conviction		New Sex Conviction		New Sex Conv or Sex Element		Overall Predictive Strength
				Recid Rate	Somers' d	Recid Rate	Somers' d	Recid Rate	Somers' d	
ISORA8	Number of victims - current offense									
	2 or fewer	915	92.7%	11.5%	0.042	3.2%	0.102	3.9%	0.133	Adequate
	3 or more	72	7.3%	18.1%		8.3%		12.5%		
ISORA8	Relationship to victim - past/current offenses									
	None of the victims was a stranger	809	82.0%	10.6%	0.103	2.6%	0.228	3.2%	0.253	Good
	One or more victims was a stranger	178	18.0%	18.0%		7.9%		10.7%		
ISORA8	Manipulation of victim - past/current offenses									
	Manipulation not present	455	46.1%	13.0%	-0.044	4.6%	-0.144	5.9%	-0.146	Poor
	Manipulation present	532	53.9%	11.1%		2.6%		3.4%		
Static99	Any unrelated victims									
	No	267	28.5%	6.0%	0.161	1.1%	0.201	1.9%	0.177	Adequate
	Yes	670	71.5%	14.3%		4.5%		5.7%		
Static99	Any stranger victims									
	No	755	80.6%	10.1%	0.144	2.3%	0.301	2.8%	0.333	Good
	Yes	182	19.4%	19.8%		8.8%		12.1%		
Static99	Any male victims									
	No	806	86.0%	12.4%	-0.037	3.5%	0.012	4.5%	0.024	Adequate
	Yes	131	14.0%	9.2%		3.8%		5.3%		

Figure 11
Individual Assessment Items: Predictive Strength
Treatment History

Tool	Assessment Item/Scoring	Total N	% of Total	New Sex/Violence Conviction		New Sex Conviction		New Sex Conv or Sex Element		Overall Predictive Strength
				Recid Rate	Somers' d	Recid Rate	Somers' d	Recid Rate	Somers' d	
ISORA8	Sex Offender Counseling or Treatment									
	Successfully completed treatment	290	29.5%	6.2%	0.301	0.7%	0.330	1.7%	0.235	Good
	Continued treatment/partial completion	360	36.5%	8.6%		3.6%		5.0%		
	Unsuccessfully terminated or no tx	337	34.0%	20.5%		5.9%		6.5%		

Iowa Risk Categories for the Revised Static-99

A group of Iowa practitioners who are experts in sex offender supervision and treatment served as an advisory group to this validation effort. After discussing the findings with regard to the Static-99, the group decided to:

- Implement the revised Static-99 (with the new current age scoring scheme recommended by Hanson).
- Explore alternative cut-off scores that define the risk categories that are based on the Iowa data, and may prove more predictive of Iowa sex offenders.

Examination of recidivism rates by total score revealed that offenders with total scores of one on the revised Static-99 (Static-99R) had recidivism rates similar to other offenders in the Low-Medium category – while the original risk categories would place these offenders in the Low risk category. As shown in Figures 12 through 14, redefining these offenders as Low-Moderate risk lowers the rate of recidivism for Low risk offenders, slightly increases the recidivism rates of the Low-Moderate group, and results in improved prediction as measured by MCR and ROC Curve results.

Other scoring schemes were explored as well, such as attempting to reduce the size of the High risk category; however, the “best fit” model resulted from just this single small change.

Figure 12. Recidivism Rates: New Conviction for Sex Offense or Other Violent Crime Static-99 Revised: Original vs. Iowa Risk Categories

Risk Category	Original Categories			Iowa Categories		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	285	14	4.9%	170	3	1.8%
Low-Moderate	373	32	8.6%	488	43	8.8%
Moderate-High	222	45	20.3%	222	45	20.3%
High	57	21	36.8%	57	21	36.8%
Totals	937	112	12.0%	937	112	12.0%
MCR Score		0.396			0.441	
ROC Curve Result		0.698			0.709	

Figure 13. Recidivism Rates: New Conviction for Sex Offense - Strict Definition Static-99 Revised: Original vs. Iowa Risk Categories

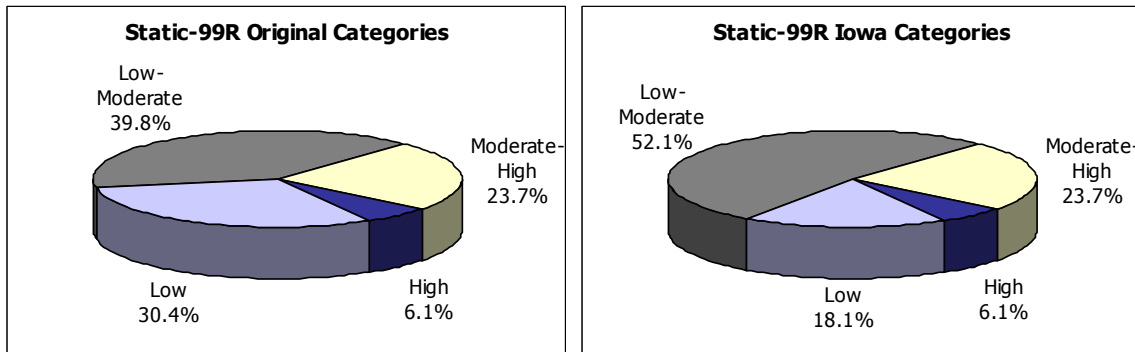
Risk Category	Original Categories			Iowa Categories		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	285	5	1.8%	170	2	1.2%
Low-Moderate	373	6	1.6%	488	9	1.8%
Moderate-High	222	14	6.3%	222	14	6.3%
High	57	8	14.0%	57	8	14.0%
Totals	937	33	3.5%	937	33	3.5%
MCR Score		0.410			0.434	
ROC Curve Result		0.705			0.717	

Figure 14. Recidivism Rates: New Conviction for Sex Offense or Crime With Sexual Element Static-99 Revised: Original vs. Iowa Risk Categories

Risk Category	Original Categories			Iowa Categories		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	285	5	1.8%	170	2	1.2%
Low-Moderate	373	9	2.4%	488	12	2.5%
Moderate-High	222	17	7.7%	222	17	7.7%
High	57	12	21.1%	57	12	21.1%
Totals	937	43	4.6%	937	43	4.6%
MCR Score		0.457			0.467	
ROC Curve Result		0.729			0.733	

Figure 15 below shows the numbers of offenders by the new Iowa risk categories in comparison with the original risk categories of the revised Static-99. The Iowa categories define roughly half of all sex offenders as Low-Moderate risk; such offenders have recidivism rates consistently below the base rate for each of the recidivism criteria studied.

Figure 15. Distribution of Offenders by Risk Category



Revised ISORA

As shown in this report, the ISORA8 proved to be a good predictor of new convictions for sex offenses and other violent crimes, and an excellent predictor of sex offenses in particular (both definitions). However, it is desirable to explore the following revisions to the ISORA8:

- Remove the items that proved to be poor predictors.
- Adopt the Static-99 definition of stranger victims to improve prediction of this item (and simplify training).
- Explore alternatives for scoring individual items that would improve prediction.
- Establish new “best fit” cut-off scores that define the risk categories.

Because of the extensive nature of these revisions, the sample was divided into a construction sample (which was used to create the revised ISORA), and a validation sample, in order to achieve immediate validation results without a separate study. After removal of the poor predictors and replacement of the Static-99 definition of stranger

victims, four different scoring schemes were devised and tested using the construction sample, followed by a total of six different methods for defining risk categories for the top two most promising scoring schemes. Two “best fit” options were then tested against the separate validation sample. One model that performed consistently better for both the construction sample and validation sample was clearly the best option. As shown in Figures 16 and 17, this model outperforms the original ISORA8, based on both MCR and ROC Curve results. The validation results for the new ISORA document that this assessment is an excellent predictor of all three recidivism criteria studied, according to MCR and ROC Curve results.

**Figure 16
Mean Cost Rating (MCR) Scores**

Recidivism Criterion	ISORA8	ISORA Construction Sample	ISORA Validation Sample
For Total (Raw) Scores:			
New Sex/Violent Conviction	0.386	0.390	0.459
New Sex Conviction - Strict	0.454	0.571	0.559
New Sex Conviction or Sexual Element	0.481	0.603	0.593
For Risk Categories:			
New Sex/Violent Conviction	0.326	0.402	0.426
New Sex Conviction - Strict	0.395	0.604	0.541
New Sex Conviction or Sexual Element	0.431	0.563	0.572

**Figure 17
ROC Curve Results**

Recidivism Criterion	ISORA8	ISORA Construction Sample	ISORA Validation Sample
For Total (Raw) Scores:			
New Sex/Violent Conviction	0.693	0.695	0.730
New Sex Conviction - Strict	0.727	0.785	0.779
New Sex Conviction or Sexual Element	0.740	0.801	0.796
For Risk Categories:			
New Sex/Violent Conviction	0.663	0.701	0.713
New Sex Conviction - Strict	0.698	0.802	0.770
New Sex Conviction or Sexual Element	0.716	0.782	0.786

Figure 18 compares the distribution of offenders by risk category for the ISORA8 and new ISORA. The ISORA classifies a much larger proportion of sex offenders as Low risk, and much smaller proportions of offenders as High and Moderate-High. The largest category, Moderate risk, are offenders whose recidivism rates are close to the base rate, as shown in Figures 19 through 21. These latter charts also document that recidivism rates for the higher risk groups in the ISORA are higher than their counterparts on the ISORA8. This is due to the identification of many more offenders as Low risk, who exhibit very low rates of recidivism.

Figure 18. Distribution of Offenders by Risk Category

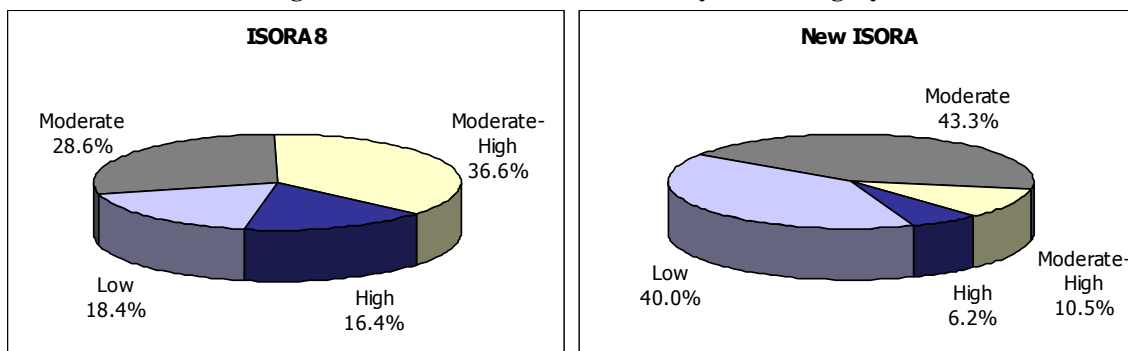


Figure 19. Recidivism Rates: New Conviction for Sex Offense or Other Violent Crime

Risk Category	ISORA8			New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	182	4	2.2%	395	11	2.8%
Moderate	282	21	7.4%	427	67	15.7%
Moderate-High	361	63	17.5%	104	22	21.2%
High	162	30	18.5%	61	18	29.5%
Totals	987	118	12.0%	987	118	12.0%

Figure 20. Recidivism Rates: New Conviction for Sex Offense - Strict Definition

Risk Category	ISORA8			New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	182	1	0.5%	395	1	0.3%
Moderate	282	4	1.4%	427	15	3.5%
Moderate-High	361	18	5.0%	104	9	8.7%
High	162	12	7.4%	61	10	16.4%
Totals	987	35	3.5%	987	35	3.5%

Figure 21. Recidivism Rates: New Conviction for Sex Offense or Crime With Sexual Element

Risk Category	ISORA8			New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	182	1	0.5%	395	1	0.3%
Moderate	282	4	1.4%	427	20	4.7%
Moderate-High	361	24	6.6%	104	13	12.5%
High	162	16	9.9%	61	11	18.0%
Totals	987	45	4.6%	987	45	4.6%

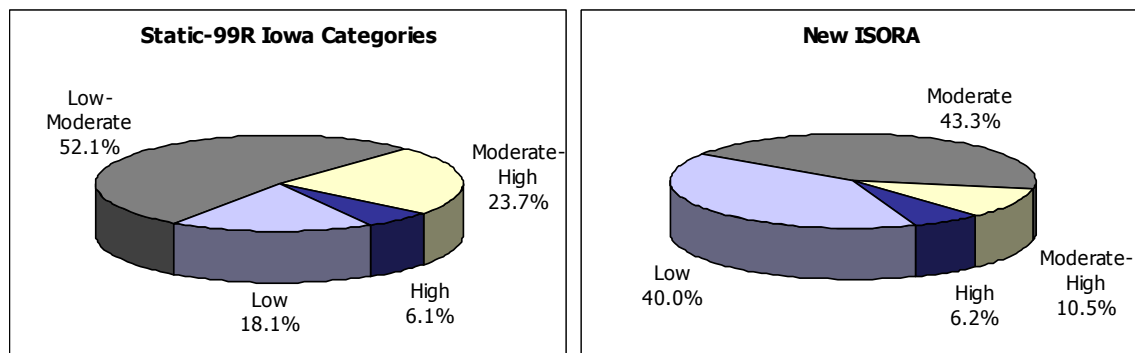
Comparison of the Static-99R & the New ISORA

This section contains information already presented, but displays it in a way that allows for ready comparison of the new assessments – the Static-99R with the Iowa risk categories, and the ISORA.

As shown in Figure 22, both assessments now employ a similar strategy of identifying a small group of offenders who have very high rates of reoffending. The notable difference is the ISORA identifies twice as many Low risk offenders – and as shown in Figures 23 through 25 on the following page, this larger group does have a very low recidivism rate.

It is important not to misinterpret the Moderate risk category of the ISORA as Low-Moderate. As documented, the recidivism rates for Low-Moderate offenders per the Static-99R have lower recidivism rates than the base rate. In contrast, the Moderate risk offenders on the ISORA have recidivism rates similar to the base rate. That is, they are distinctly Moderate in risk, and more at risk for recidivism than the Low-Moderate group on the Static-99R.

Figure 22. Distribution of Offenders by Risk Category



Of course, the sex offenders being assessed by these instruments are largely the same set of offenders (with the exception of some offenders who may not be assessed using the Static-99R). Case managers may choose to complete both assessments in order to gain insight into a particular offender's risk. For example, if a sex offender scores Low-Moderate on the Static-99R, completing an ISORA would assist in clarifying whether the offender is actually Low risk, or higher risk. Conversely, if an offender scores Moderate on the ISORA, completion of the Static-99R would assist in determining whether the offender's chances of recidivism are lower or higher than the base rate.

Regarding statistical validity, both the Static-99R (with the Iowa risk categories) and the ISORA are excellent predictors of new convictions for sex offenses or other violent crimes, as well as sex offenses in particular. The ISORA performed better according to most statistical measures of predictive validity. The new ISORA instrument is shown in Figure 26 on the following page.

Figure 23. Recidivism Rates: New Conviction for Sex Offense or Other Violent Crime

Risk Category	Static-99R			New ISORA6		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	170	3	1.8%	395	11	2.8%
Low-Moderate/Moderate	488	43	8.8%	427	67	15.7%
Moderate-High	222	45	20.3%	104	22	21.2%
High	57	21	36.8%	61	18	29.5%
Totals	937	112	12.0%	987	118	12.0%
Validation MCR Score	0.441			0.426		
Validation ROC Curve Result	0.709			0.713		

Figure 24. Recidivism Rates: New Conviction for Sex Offense - Strict Definition

Risk Category	Static-99R			New ISORA6		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	170	2	1.2%	395	1	0.3%
Low-Moderate/Moderate	488	9	1.8%	427	15	3.5%
Moderate-High	222	14	6.3%	104	9	8.7%
High	57	8	14.0%	61	10	16.4%
Totals	937	33	3.5%	987	35	3.5%
Validation MCR Score	0.434			0.541		
Validation ROC Curve Result	0.717			0.770		

Figure 25. Recidivism Rates: New Conviction for Sex Offense or Crime With Sexual Element

Risk Category	Static-99R			New ISORA6		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	170	2	1.2%	395	1	0.3%
Low-Moderate/Moderate	488	12	2.5%	427	20	4.7%
Moderate-High	222	17	7.7%	104	13	12.5%
High	57	12	21.1%	61	11	18.0%
Totals	937	43	4.6%	987	45	4.6%
Validation MCR Score	0.467			0.572		
Validation ROC Curve Result	0.733			0.786		

**Figure 26. New ISORA
SEX OFFENDER RISK ASSESSMENT: ISORA**

RISK FACTOR	VALUE	SCORE
I. Offender Risk Factors/Criminal History		
1. Offender's age at first conviction or adjudication for sex-related offenses more than 25 years old 25 years old or less	0 1	
2. Number of arrests for sex offenses (include all sex offenses) no sex-related arrests one sex-related arrest two or more sex-related arrests <i>(one arrest with two or more charges, still counts as one arrest)</i>	0 1 4	
3. Prior non-sex-related crimes (do not include sex offenses) no prior criminal history offender <u>had</u> a prior criminal history	0 1	
II. Victim Risk Factors		
4. Number of victims (qualifying or current offense only) Two or fewer victims Three or more victims	0 3	
5. Any stranger victims No Yes	0 4	
III. Treatment Risk Factor		
6. Sex offender counseling and/or treatment If offender has: successfully completed treatment continued treatment or partially completed treatment unsuccessfully terminated or received no treatment	0 1 3	
TOTAL RISK ASSESSMENT SCORE		
RISK CATEGORY (Low 0-3; Moderate 4-7; Moderate/High 8-9; High 10+)		

One additional comparison between the two new assessments is correlation. That is, how often offenders score high on both, low on both, and so forth.

Pearson's R is a commonly used correlation coefficient – a statistic that describes the strength of the association. Pearson's R ranges between -1 and +1; zero indicates no relationship, -1 indicates a perfect *negative* relationship (e.g., when one is high, the other is low), and +1 indicates a perfect *positive* relationship (e.g., when one is high, the other is high). The Pearson's R with regard to the two new sex offender risk assessments is .411, suggesting a moderate to strong relationship, given the subject under scrutiny is in the social sciences (that is, prediction of human behavior).

In real terms, here is how the Static-99R compared with the new ISORA for offenders at each risk category:

- 66.5% of offenders who score Low risk on the Static-99R also score Low risk on the ISORA. Of the remaining Low risk, all but 8 score Moderate risk on the ISORA.
- 41.8% of offenders who score Low-Moderate risk on the Static-99R score Low risk on the ISORA; another 48.4% score Moderate risk on the ISORA. This illustrates how completion of the ISORA on offenders who score Low-Moderate on the Static-99R can provide further information with regard to the probability of recidivism for this group of offenders.
- 19.8% of offenders who score Moderate-High risk on the Static-99R also score Moderate-High risk on the ISORA; 47.3% score Moderate risk on the ISORA, and 11.7% score High risk on the ISORA.
- 36.8% of offenders who score High risk on the Static-99R also score High risk on the ISORA; 24.6% score Moderate-High risk on the ISORA, and all but 5 of the remainder score Moderate risk.

Looking at the offenders who score Moderate risk on the ISORA, 58.0% score Low-Moderate risk on the Static-99R, and 25.8% score Moderate-High on the Static-99R. This illustrates how completion of the Static-99R on offenders who score Moderate risk on the ISORA can provide further information with regard to the probability of recidivism for this group of offenders.

The ISORA & Female Sex Offenders

The number of women sex offenders in Iowa is small, with only 23 in the study sample. However, the ISORA does appear promising with regard to predictive validity for female sex offenders. As shown in Figure 27, 14 or about 61% of female sex offenders scored Low risk, and none incurred a new conviction for a sex offense or other violent crime. Eight or about 35% of female sex offenders scored Moderate risk, and one was convicted of a new sex offense. The one female sex offender who scored High risk had no new conviction for sex or other violent crime.

The MCR Score and ROC Curve result for this small sample would suggest excellent prediction for female sex offenders. However, because of the small number involved, it is encouraged that readers view these results as “promising.”

Figure 27. Recidivism Rates: New Conviction for Sex Offenses
(Also Applies to New Conviction for Sex/Other Violent Crime, and New Conviction for a Sex Offense or Crime with a Sexual Element)

Risk Category	New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %
Low	14	0	0.0%
Moderate	8	1	12.5%
Moderate-High	0	0	--
High	1	0	0.0%
Totals	23	1	4.3%
MCR Score	0.591		
ROC Curve Result	0.795		

An additional indication that the ISORA holds promise with regard to predictive validity for female sex offenders, is with regard to recidivism data for any new conviction. Figure 28 shows that female sex offenders classified as Low risk were also Low risk for any type of new conviction; higher risk offenders were also higher risk for any type of new conviction.

Figure 28. Recidivism Rates: Any New Conviction

Risk Category	New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %
Low	14	1	7.1%
Moderate	8	4	50.0%
Moderate-High	0	0	--
High	1	1	100.0%
Totals	23	6	26.1%
MCR Score	0.637		
ROC Curve Result	0.819		

Note: Offenders whose first conviction was for other than a new sex offense or other violent crime continued to be tracked for sex/violence recidivism. Offenders who lacked a minimum of two years of opportunity time for sex/violence were excluded from the study, even if new convictions for non-violent crime had occurred.

Predicting Any New Convictions

As explained in the Methodology section of this report, preliminary findings based on a partial sample found neither the ISORA8 nor the Static-99 to be a good predictor with regard to any new conviction. However, this information was retained, and provides an indication of the general risk of recidivism as measured by new convictions by sex offender risk assessment categories.

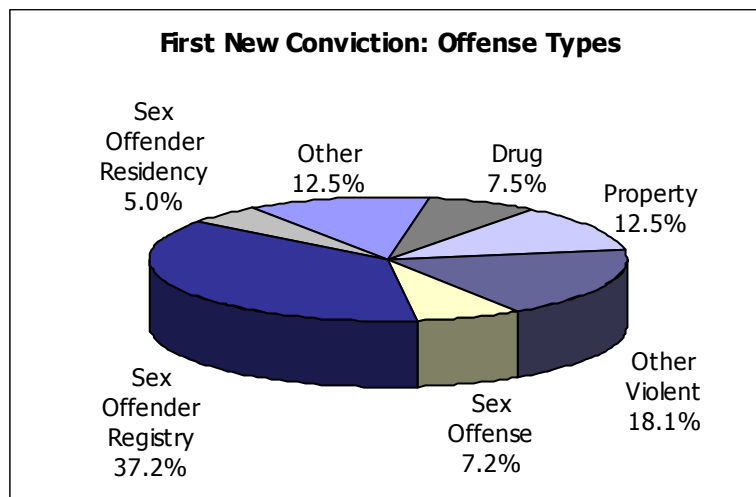
Please note offenders whose first conviction was for other than a new sex offense or other violent crime continued to be tracked for sex/violence recidivism. Offenders who lacked a minimum of two years of opportunity time for sex/violence were excluded from the study, even if new convictions for non-violent crime had occurred. Results with regard to female sex offenders are shown on the previous page. Figure 29 below displays results for all offenders. As shown, both the Static-99R (with the Iowa risk categories) and new ISORA exceed the Fischer standard MCR score of .250 and thus demonstrate utility for use in predicting the risk of any new conviction among sex offenders.

Figure 29. Recidivism Rates: Any New Conviction

Risk Category	Static-99R			New ISORA		
	Total in Sample	Recidivism: N	Recidivism: %	Total in Sample	Recidivism: N	Recidivism: %
Low	170	31	18.2%	395	90	22.8%
Low-Moderate/Moderate	488	171	35.0%	427	189	44.3%
Moderate-High	222	105	47.3%	104	50	48.1%
High	57	36	63.2%	61	31	50.8%
Totals	937	343	36.6%	987	360	36.5%
MCR Score	0.257			0.252		
ROC Curve Result	0.629			0.626		

Figure 30 shows the types of offenses involved in the 360 first new convictions. Of particular note is the high frequency of sex offender registry/sex offender residency violations.

Figure 30. Recidivism Rates: Any New Conviction



Using Both Assessments Together (Male Offenders Only)

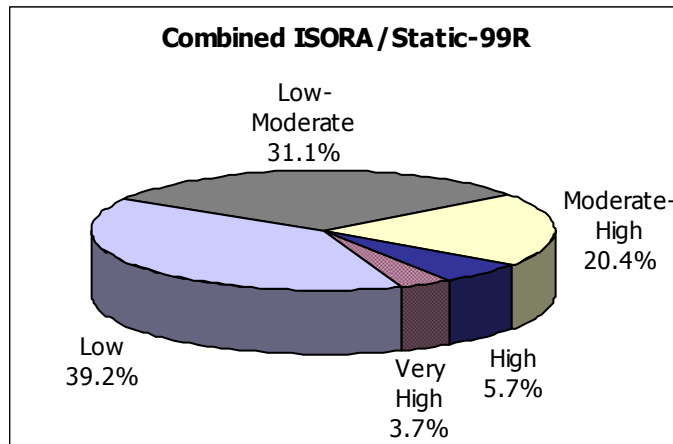
The predictive strength of both the new assessments may be combined to more effectively determine the risk of male sex offenders. Five separate scoring combinations were tested, resulting in the following “best fit” model. As can be seen in Figure 31, which shows how the Final Risk Category is obtained, using both assessments together makes use of the ISORA’s strength of identifying truly Low risk offenders, in tandem with the Static-99R’s strength of identifying an elite group of High risk offenders who have very high recidivism rates. Figure 32 shows the distribution of offenders by combined risk category, and Figure 33 documents combined risk assessment is an excellent predictor of recidivism.

Figure 31. Recidivism Rates: Any New Conviction

	If ISORA is:			
	Low	Moderate	Moderate-High	High
And Static-99R is:				
Low	Low	Low-Moderate	Low-Moderate	Moderate-High
Low-Moderate	Low	Low-Moderate	Moderate-High	High
Moderate-High	Low	Moderate-High	Moderate-High	High
High	Low	High	Very High	Very High

Final Risk Category is found in the cell that corresponds to each combination of ISORA and Static-99R.

Figure 32. Distribution of Offenders by Risk Category



**Figure 33. Validation Statistics
Combined Scores: Statistical Validity**

Recidivism Criterion	Mean Cost Rating	ROC Curve
New Sex/Violent Conviction	0.490	0.745
New Sex Conviction - Strict	0.614	0.807
New Sex Conviction or Sexual Element	0.630	0.815